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Developing, validating, and measuring *Content Knowledge for Teaching:* **An example from energy in mechanics**[1]

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In carrying out tasks of teaching, teachers enact specialized knowledge that content experts who are not teachers do not use (and most likely do not have). The concept of content knowledge for teaching (CKT) originated with the work of Shulman (1986) and was more fully developed by Ball and colleagues (Ball, Thames, & Phelps, 2008). CKT is premised on the idea that teachers need to understand subject matter content in ways that are specific to teaching, such as understanding challenges that specific content might present to students and how students may represent their understanding in non-standard forms, knowing how to ask questions or provide explanations that can move understanding forward, etc. (Ball & Bass, 2003). How do we operationalize such a construct, validate it, and measure it in distinct ways (in teacher assessments, classroom observations, and teaching artifact analysis)? What is the relationship between these measures and student learning? In this talk, a multi-year, multi-institutional, ongoing effort to pursue these research questions will be described, the project framework will be shared, sample assessments items will be illustrated, and preliminary results from a pilot study and the full field test involving about 560 high school physics teachers will be discussed. Implications for teacher education programs and physics faculty and TA development efforts will be highlighted.